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ABSTRACT

Science core curricula for allied health students have been plagued by accreditation impediments and criticized for insufficient depth and irrelevance. Health center basic science departments are administered under various arrangements. Superimposed on this basic science organizational variety is the complexity of the colleges of allied health. Typically, they offer several programs with distinct curricula and unique accreditation standards imposed by different accrediting bodies. The purpose of this study was to identify and validate criteria that can be used to evaluate the delivery system for science related courses for baccalaureate allied health students in academic centers. Included in this study is an explanation of Stark's Framework which was used to evaluate the criteria in this study. There are 62 references. (CW)

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# An Application of Stark's Framework: Identification and Validation of Criteria To Evaluate Science Course Delivery Systems

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# AN APPLICATION OF STARK'S FRAMEWORK: IDENTIFICATION AND VALIDATION OF CRITERIA TO EVALUATE SCIENCE COURSE DELIVERY SYSTEMS

By

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1988



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## FOREWORD

The Institute of Higher Education at the University of Florida has been active in research studies that provide bases for improving higher education. This study by Dr. Zolika Heath is one of those studies. The purpose was to develop criteria which can be used to evaluate the science course delivery system for baccalaureate allied health students in academic health centers. Science courses for allied health students were delivered under a variety of organizational auspicies. The criteria identified and validated accomodate these different structures and are applicable across science disciplines and allied health programs.

Specific recommendations for a college of allied health to use in adapting, adopting, and implementing the criteria are provided. Also other organizations for which the criteria could be used are listed as nonhealth center allied health units, other health center colleges, and accreditation agencies. Suggestions for further research are also provided.

We are pleased to provide this study to interested persons. Stark's framework was most useful in the development of this study and we appreciate that professional contribution in particular.

James L. Wattenbarger
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September, 1988

TABLE OF CONTENTS

Page

FOREWORD.....ii

TABLE OF CONTENTS.....iv

LIST OF TABLES.....vi

LIST OF FIGURES.....vii

SECTIONS

I INTRODUCTION.....1

Operational Definitions.....4
Study Design.....6
Limitations.....7
Significance of the Study.....8

II REVIEW OF THE LITERATURE.....11

Stark's Framework.....11
Use of the Framework in this Study.....15
Science Related Courses.....16

III RESULTS.....29

Preliminary Statements.....29
Science Related Course Faculty Qualifications.....34
Expectations for Science Related Course Faculty....38
Role of Dean and Faculty in the Evaluation of Non-CAH Faculty.....43
CAH Control of Delivery and Content of Science Related Courses.....46
Summary.....55

Page

SECTIONS

V SUMMARY AND CONCLUSIONS.....57

Summary.....57
Criteria.....59
Discussion.....64
Weaknesses.....68
Implementation of the Criteria.....68
Recommendations for a CAH to Adopt the Criteria....69
Suggestions for Further Research and Practice.....71
Conclusion.....74

REFERENCES.....77

LIST OF TABLES


| Table | | Page |
|---|---|---|
| 1. | Percent Consensus re: Statements 01, 01A, 04, and 04A | 30 |
| 2. | Rank of Importance of Factors in Establishing Science Related Course Faculty Academic Credentials | 32 |
| 3. | Rank of Importance of Factors in Establishing Science Related Course Faculty Professional Credentials | 33 |
| 4. | Percent Consensus re: Science Related Course Faculty Qualifications | 35 |
| 5. | Percent Consensus re: Science Related Course Faculty Roles by Organizational Structure: Sponsor (S) and Faculty (F) | 40 |
| 6. | Percent Consensus re: Science Related Course Faculty Counseling Roles | 41 |
| 7. | Percent Consensus re: Role of the CAH Dean in Evaluation of non-CAH Science Related Courses | 44 |
| 8. | Percent Consensus re: CAH Evaluation of NCAH Faculty Who Teach Science Related Courses | 45 |
| 9. | Rank of Locus of Responsibility for Allied Health Curricula | 47 |
| 10. | Percent Consensus re: Curricula Responsibility | 48 |
| 11. | Percent Consensus re: CAH Dean Responsibility for Science Related Courses | 49 |
| 12. | Consensus re: CAH Faculty Responsibility for Science Related Courses by Organizational Structure: Sponsor (S) and Faculty (F) | 51 |

LIST OF FIGURES


| Figure | | Page |
|---|---|---|
| 1. | Professional Preparation Outcomes | 13 |
| 2. | Specific Influences on Professional Preparation Programs | 14 |

## SECTION I

## INTRODUCTION

A comprehensive study of the organization and governance of academic health centers (AHC) [an institution that includes a school of medicine, a teaching hospital, and at least one additional health educational program] was initiated by the Association of Academic Health Centers (AAHC) in 1977. Among the topics addressed were departmental structure/administration and interschool relationships. Conclusions were in part that "inadequate interschool coordination and cooperation often result in significant administrative problems concerning the provision of interdisciplinary education" (AAHC, 1980a, p. 10) and "the organizational location of the basic science departments and the quality of the teaching program for students in fields other than medicine continue to present problems for those AHCs with several health schools" (AAHC, 1980a, p. 9).

Many of the allied health professions claim that their practice is or should be dependent on supporting biophysical sciences (Covey & Burke, 1987; Hinkle, 1986). However several studies indicate that the delivery system for basic and applied science courses for health professions students constitutes a major challenge (Clarke, 1983; Krieger, 1977; Lewis, 1981; Perkins & Crandell, 1985; Sirota, 1981). Science core curricula for allied health students have been

plagued by accreditation impediments and criticized for insufficient depth and irrelevance (Association of Schools of Allied Health Professions, 1973).

Health center basic science departments are administered under various arrangements. Authors of the AAHC governance study (1980b) reported basic science departments located in colleges of medicine, in each of the health centers' schools, in health center-wide arrangements, or in university-wide systems. Superimposed upon this basic science organizational variety is the complexity of the colleges of allied health. Typically they offer several programs with distinct curricula and unique accreditation standards imposed by different accrediting bodies. Structurally, the colleges may be autonomous entities, subdivisions of larger units such as a college of medicine, or loose confederations of health programs (Kleinfelter, 1976; Rosenfeld, 1972; Wise, 1979).

In a survey of organizational structure of colleges of allied health, respondents attributed many of their problems, such as course duplication, conflicts with other departments, and inadequate laboratory facilities to organizational structure (Kleinfelter, 1976). The various accreditation standards invariably address biophysical science course content but from their own unique perspectives. The literature has failed to reveal any common set of criteria upon which a college of allied health

(CAH) faculty could evaluate the delivery system for its biophysical science curricular components for students in all programs.

Stark, Lowther, Hagerty, and Orczky (1986) have proposed a framework for the study of professional degree programs in four-year colleges and universities. "Briefly, it asserts that professional preparation programs are influenced by internal, intraorganizational, and external forces" (p. 236). These forces, they claim, interact to create the professional preparation environment which influences educational processes which result in professional preparation outcomes. The outcomes consist of two categories, professional competencies and professional attitudes. Several elements of the former category, namely conceptual competence, concern the goals of the biophysical sciences in allied health curricula.

The purpose of this study was to identify and validate criteria using the Stark et al. framework, that can be used to evaluate the delivery system for science related courses for baccalaureate allied health students in academic health centers. Criteria were identified and validated to answer the following questions:

1. What professional and academic qualifications should science related course faculty have?

2. In what roles should science related course faculty engage?

3. What control should the college of allied health dean and faculty have in the evaluation of science related course faculty who do not have primary appointments in the college?

4. What control should the allied health faculty and dean have upon the delivery and content of science related courses?

## Operational Definitions

Adaptive competence is the ability to anticipate and adapt to changes (e.g., technological changes) important to the profession (Stark et al., 1986).

Allied health refers to those occupations which are health related and have educational programs in colleges of allied health, such as medical technology, physician assistant, and respiratory therapy. This excludes most of the older, independent, or more established occupations namely dentistry, medicine, nursing, and pharmacy.

Allied health faculty are instructors with a health science credential and a primary appointment in a college of allied health, who teach baccalaureate level allied health students in the classroom.

Basic science faculty are instructors who teach one or more science related course to baccalaureate level allied health students. They usually have a graduate degree in a

biophysical science, do not hold a health professional credential, and may or may not have a college of allied health appointment.

Conceptual competence is the understanding of the theoretical foundations of the profession (Stark et al., 1986).

Criteria are written statements on which a judgment or decision may be based. In this study, criteria are distinguished from standards and guidelines in that the latter are specifically for the purposes of accreditation.

Delivery system relative to the science related courses refers to those elements such as faculty, nonhuman resources, locus of control, and organizational structure which are antecedent to the presentation of the courses.

Integrative competence is the ability to integrate theory and practice (Stark et al., 1986).

Interpersonal communication is the ability to use written or oral communication effectvely (Stark et al., 1986).

Professional courses are those theoretical and practical required subjects which result in the student being able to demonstrate prescribed competencies i.e., to practice the profession. This includes all professional phase required courses except those identified as science related.

Scholarly concern for improvement is the degree to which a graduate recognizes the need to increase knowledge through research (Stark et al., 1986).

Science related courses (SRC) are basic or applied biophysical science subjects which health professions students take during enrollment in the professional program. The published catalog descriptions for these courses, indicate to a panel of experts, that a major expected outcome is the development of conceptual competence as defined by Stark et al. It excludes prerequisites, clinical practice, social sciences, and professional or technical methods courses.

Technical competence is the ability to perform tasks required of the profession (Stark et al., 1986).

## Study Design

A review of the literature was undertaken regarding academic health center based colleges of allied health, their faculty and administrators. Accreditation standards for 20 health professions were examined. Mission statements and goals claimed by several AHCs and their universities and colleges of allied health were reviewed. Using the professional education framework developed by Stark J. S., Lowther M.A., Hagerty B.M.K., and Orczyk C. (1986), as a guide, the literature review was focused to identify and define further biophysical science in the allied health curricula.

From the literature review statements were formulated upon which the science related course delivery systems in colleges of allied health could be evaluated. After a critique by three experts the statements and supporting information were revised and prepared for a three round modified Delphi study with a panel of 21 experts selected from seven academic health centers.

## Limitations

The panelists who participated in the development of the criteria were academic faculty (allied health or basic science) and deans. Individuals who taught exclusively in the clinical area and students were not included. The strength of the criteria formulated were a reflection of the appropriateness of the framework developed by Stark et al., the literature review, and the expertise and contributions of the panel participants.

One limitation results from developing criteria general enough to apply to any biophysical science course for any baccalaureate allied health program. Other studies are usually limited to one science or a few allied health programs. Similarily specialized accreditation standards are designed for one allied health program. Broad based criteria could be considered not applicable for or by a paticular profession.

The operational definition of a science related course (SRC) is both asset and liability. The term is unique. The

grouping of what may be labled basic, applied, fundamental, bridge, clinical, or professional sciences under one category may appear artificial (Thier, 1987). This may represent an unfamiliar way of viewing the allied health curricula. This may be perceived as an impingement on professional course "turf" or the attenuation of science. The courses may be difficult to identify in programs that use an integrated curriculum, that is, basic science and professional content combined in one course.

The validity of the aggregation of these courses is a function of the methods used to identify them and the assumptions on which these methods rest. In brief a group of experts determined that the course descriptions met a criterion of the Stark et al. framework. These experts were from a different AHC than the participating faculty and deans of this study. This approach assumes that both the framework and expert opinion have validity.

## Significance of the Study

Although allied health occupations "differ with respect to the scientific foundations of their knowledge base" (National Commission on Allied Health Education [NCAHE], 1980, p. 66), science courses constitute an impotant curricular segment for most. Perusal of accreditation standards and college catalogs confirm this. The fact that science related course delivery for allied health students is often a challenge is indisputable (Clarke, 1983; Perkins

& Crandell, 1985; Sirota, 1981). Furthermore the location of an allied health program in an academic health center--the citadel for health sciences education--need not ameliorate the problems (AAHC, 1980a, p. 9).

Unlike their counterpart colleges in the AHC, colleges of allied health graduate practitioners for many different professions. Faculty among the different programs may be unaware of course similarities and duplications (NCAHE, 1980). CAH quality assurance mechanisms may include external review by a different accreditation agency for each program. Many contend that this represents needless repetition and some question if specialized program accreditation even addresses AHC/university concerns (Freeland, 1986; Schermerhorn, 1986).

This study presents a set of criteria that can be used to evaluate a curricular segment shared by most allied health programs, that is, science related courses. Although these criteria are limited to baccalaureate level programs that are health center based it is asserted that they are applicable across science disciplines and allied health programs. Also it is posited that the criteria may have usefulness for different academic levels and different educational settings.

## SECTION II

## REVIEW OF THE LITERATURE

This section will describe the Stark, Lowther, Hagerty, and Orczyk framework. It's use in this study will be explained. Lastly studies relevant to the science related courses in allied health curricula and the science course delivery systems in the colleges will be discussed.

Students are increasingly choosing occupational rather than liberal arts majors (Karabel, 1986; Stark, 1986). Because professional curricula vary markedly it is difficult for administrators to understand each program. But it is essential that administrators develop a working knowledge of the programs they purport to lead. Educators, researchers, and administrators are commonly unaware of the similarities and differences among professional programs; therefore cross-program comparisons lend themselves to investigator bias and use of noncomparable data (Stark, Lowther, Hagerty, & Orczyk, 1986).

### Stark's Framework

Stark, Lowther, Hagerty, and Orczyk (1986) claimed that a standard framework for cross-professional program study would enhance objectivity, accomodate change over time, reduce or eliminate specialized language and the resulting confusion, distinguish between preservice and continuing education, and clarify the often ambiguous meaning of "professional competence" (pp. 232-3).

The Stark et al. (1986)

> framework asserts that professional preparation programs are influenced by internal, intraorganizational, and external forces [see Figure 1]. These forces interact to create a professional preparation 'environment' which, in turn, influences the design of educational processes intended to achieve professional preparation outcomes. . . . Finally the extent to which the outcomes are achieved and, thus, the orientation of the new professionals, influences the internal, intraorganizational, and external forces. (p. 236)

The external influences consist of two major categories, societal influences and professional community characteristics, each of which have several more specific elements (see Figure 2). Elements of the internal influences are grouped under four categories; mission, program structure, curricular tensions, and continuing professional involvement, also shown in Figure 2. There are two major categories of outcomes, professional competencies and professional attitudes (see Figure 1).

Hundreds of professional and liberal arts and science faculty have participated in the development of this framework. To determine "the ability of the framework to assist in mapping differences among programs" Stark, Lowther, and Hagerty (1987, p. 533) obtained and analysed a national sample of professional faculty opinion. The purpose was to identify discriminators among entry level professional programs and to determine if "each professional field had a unique preparation environment" (p. 533).

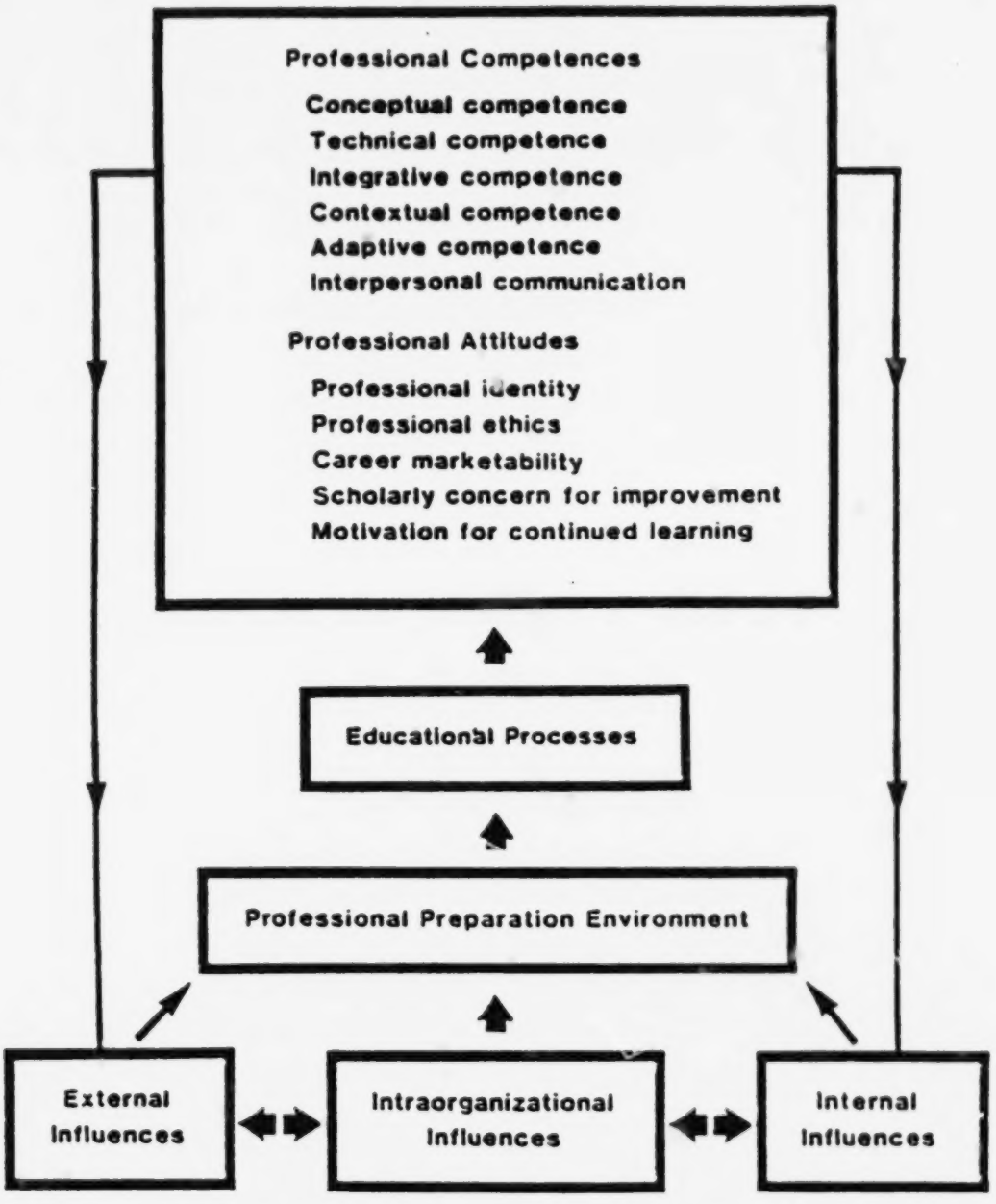


Figure 1. Professional Preparation Outcomes. Note. From, "A conceptual framework for the study of preservice professional programs in colleges and universities" by JS Stark, MA Lowther, BMK Hagerty, & C Orczyk, 1986, Journal of Higher Education, 57, pp. 237 & 244. Copyright 1986 by the Ohio State University Press. Reprinted by permission.



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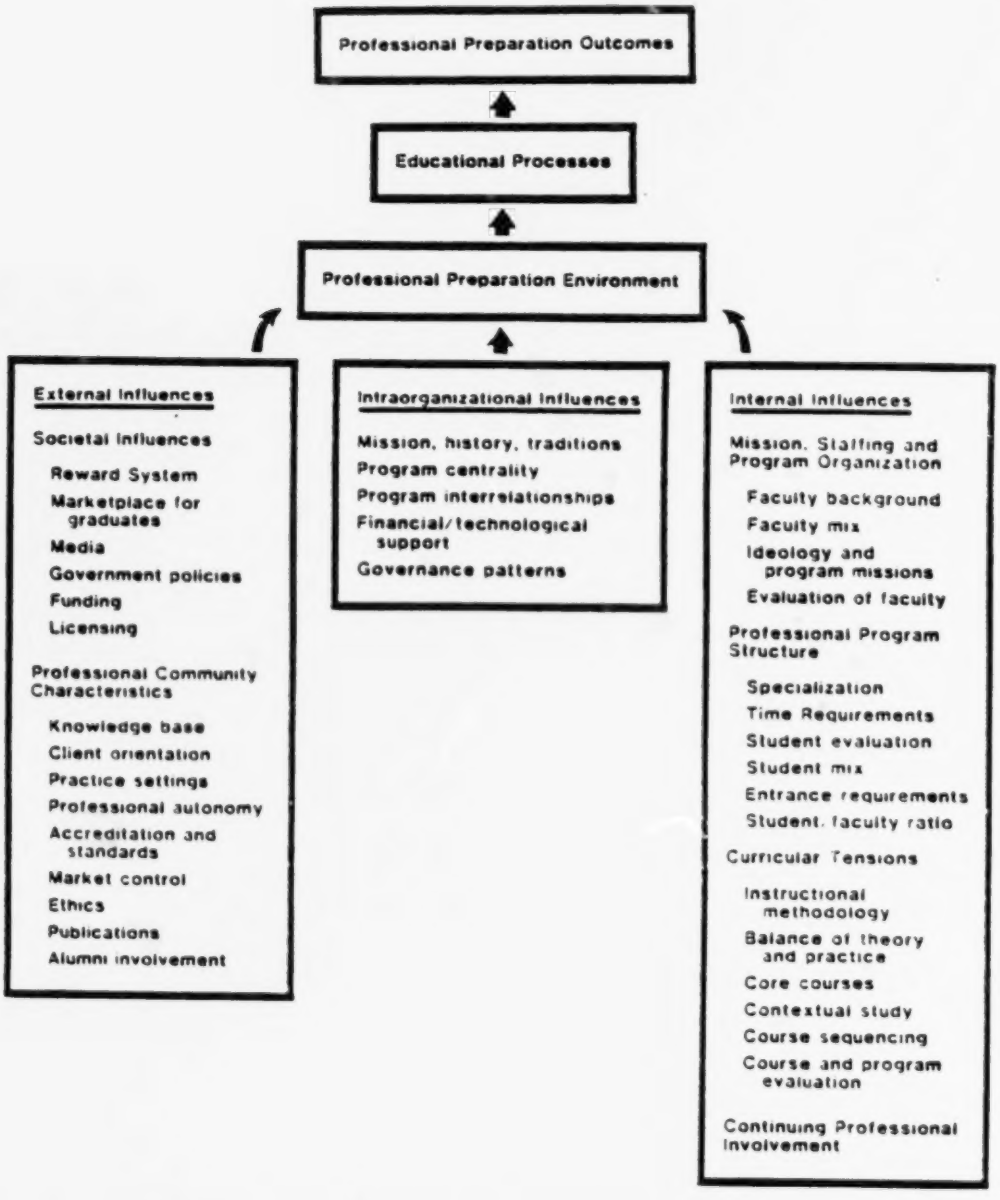


Figure 2. Specific Influences on Professional Preparation Programs.
Note. From, "A conceptual framework for the study of preservice professional programs in colleges and universities" by JS Stark, MA Lowther, BMK Hagerty, & C Orczyk, 1986, Journal of Higher Education, 57, p. 239. Copyright 1986 by the Ohio State University Press. Reprinted by permission.



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Faculty (n=2217) of 11 professions in 732 programs among 346 universities and colleges participated. Interested readers should consult this article.

Use of the Framework in this Study

The Stark et al. framework was used to assist in the identification of science related courses for this study. A particular course may make a major contribution to the development of some outcomes and a negligible one toward others. Science related courses can be perceived as fostering the acquisition of conceptual competencies in the biophysical sciences for all allied health students. They may have a limited role in the development of other competencies such as interpersonal communication or professional identity. This is most apparent in the case of prerequsite basic sciences, core courses, and sciences designed for other health professions students but open to allied health students.

The contribution of a science course toward competence and attitude acqusition may vary with the science and/or profession. For example, the skills developed in the gross anatomy laboratory may contribute little toward the technical competencies that an occupational therapist will use in professional practice. But the skills acquired in the microbiology laboratory may be germane to the activities of a future medical technologist. However in both situations the development of conceptual competence in a

biophysical science, supportative of professional practice, remains a primary goal. The other outcomes described by Stark et al. (1986) for which science related courses may play a pivotal role are in the development of integrative and adaptive competencies and a scholarly concern for improvement.

Recall that science related courses are required professional phase biophysical sciences, the primary objectives of which are to develop conceptual competencies. Secondary objectives may concern integrative and adaptive competencies and the development of a concern for scholarly improvement. Thus, it was outcome as reflected by the course description, and as interperted by a small panel of experts that served to identify courses as science related.

The framework also served to structure the science related course delivery system issues and proposed criteria. Each proposed statement was representative of a category or specific element of the external, intraorganizational, or internal influences. The literature review revealed that areas of primary concern for this study were knowledge base; accreditation standards; program interrelationships; mission, staffing, and program organization; faculty characteristics; and curricular tensions.

## Science Related Courses

Concern for a theoretical mastery (conceptual competence) of professionally relevant biophysical science

for allied health professionals was evident in a broad array of literature. Medical technology "faculty feel that a major strength of the program is the basic science preparation provided its students" (Florida Board of Regents, 1983, p. 52). Dietitians are committed to "advancing the science of nutrition" (Hart, 1979, p. 127), they contribute "special knowledge of biochemistry, physiology, nutrition, and drug interaction with nutrients" (p. 127). "Occupational therapy student[s] need [to] study pathology . . . as a means to understanding occupational dysfunction" (Johnson, 1974, p. 212). "To understand and use the apparatus and techniques of anaesthesia, anaesthetists require a knowledge of basic physics" (Duffin, 1976, p. vii).

"How much [science background] to acquire and to what depth are as yet unanswered questions" (Duffin, 1976, p. vii). As health professions have developed and matured a common theme has been the advocacy of more science prerequisite to and during the curricula. This has occured in medicine, dentistry, nursing, and pharmacy (Flexner, 1910; Gies, 1926; Goldmark, 1923; Mrtek, 1976). These same trends were apparent within the allied health professional literature.

Hart (1979) quoted from the 1972 Millis commission on dietetics "the amount and quality of nutrition science learning seem inadequate to form a firm base for" (p. 118)

professional practice. Collier and Youtsey (1979) wrote that respiratory therapy professional content is "based on a core knowledge in . . . chemistry, physics, basic anatomy, and physiology" (p. 110). In a historical review of radiological technologies curricula, Soule (1974) traced the education from on-the-job training to "three years (90 semester hours) of acceptable college credit and [a] major in the biological or physical sciences" (p. 155). Rhoton and Gravenstein (1977) justified the implementation of an undergraduate anesthesia program in a university setting, "because of the need for students to understand and manipulate concepts rather than simply to perform technical tasks in routine settings" (p. 10). Some contend that "people who act as leaders in health must have a strong background in basic science" (NCAHE, 1980, p. 7).

Most science advocates, like the authors cited above directed their remarks to specific health professions. For the allied health professions collectively, the literature on biophysical sciences was sparse. When the sciences were addressed it usually concerned the delivery or advocacy of core courses (Bassoff, 1983; Connelly, 1978; Wutka & Baxter, 1981). The National Commission on Allied Health Education (1980) claimed program faculty "may be unaware that some of their own courses, particularly in basic sciences, essentially duplicate those of other programs" (p. 144). Of the commission's recommendations one mentioned the sciences.

> Arrangements should be made for maximum use of existing institutional resources, including shared courses. In particular, whenever possible, allied health students should receive instruction in the basic sciences and humanities through participation in general university courses offered by faculty of the department in those disciplines rather than in special courses offered exclusively for allied health majors. (NCAHE, 1980, p. 204)

One explanation of this recommendation may have been the commission's awarness of the difficulty health professions students have reported in transfering credits (Bernstein, 1986; Brooks, 1985). This phenomenon was summarized by Rhoton and Gravenstein (1977).

> The typical nursing curriculum prescribed specialty credits in the basic sciences rather than requiring or allowing students to register for comparable courses offered by basic science departments. The level of the nurse's academic preparation in the sciences was therefore not comparable to that of other science majors. Nursing students found themselves generally unable to apply their specialty credits toward graduate study in areas outside nursing. (p. 3)

Some studies of science course content or the associated delevery system have indicated that there is indeed a basis to question the credibility of these courses for undergraduate health science students.

Clarke (1983) examined the views of 286 medical technology faculty, students, administrators, and advisors about their curricula. "Differences were found in the academic preparation with deficiencies noted in pathogenic microbiology, immunology, biochemistry, and instrumentation" (p. 2372-A).

Sirota (1981) studied the teaching of biochemistry for dietetics students in all programs in the United States by a survey of dietetics directors and biochemistry instructors. One finding was that total class and laboratory contact hours ranged from 39 to 280.5. There was more emphasis on qualitative than theoretical or conceptual material. She concluded there was little communication between biochemistry instructors and dietetics departments, minimal input from nutritionists about course content, and "great variability in the biochemistry education of future dietitians" (p. 4467-B).

Krieger (1977) queried 152 allied health and science support faculty in selected Florida community colleges for opinions about needed bio-organic course content. Faculty indicated a) a preference for minimal laboratory experience, but when appropriate believed it should occur during clinical practice rather than during the chemistry course laboratory; b) courses should carry general education, not specialty credit; and c) a need to update their own knowledge of the items on the questionnaire.

From a literature review, Perkin and Crandell (1985) established that physician assistants performed "diet therapy and nutrition counseling and/or prescribing" (p. 185). They reviewed the curricula of 91% of all U.S. physician assistant programs for nutrition content. Nutrition classes averaged 13.3 clock hours. Content was

presented as separate courses, parts of other courses, or during clinical rotations. The authors concluded, that "nutrition content is rather limited . . . [with] a great deal of variation . . . independent of the type of degree . . .[and] related more to faculty interests and institutional resources than to length of the curriculum" (p. 187).

Gerald (1976) reviewed pharmacology courses taught by college of pharmacy faculty to nonpharmacy majors. He noted the enrollment of many allied health students who did not have a pharmacology course in their curricula. Riley (1978) advocated a "more scientific orientation" (p. 6) for teaching pharmacology to nursing students. Robinson (1987) reported results of a pharmacology examination given to recently graduated nurses. Nurses who had completed a separate pharmacology course scored significantly better than those who had received pharmacology by an integrated curriculum. In the interest of quality, Freston (1976) proposed that pharmacology departments be responsible for all pharmacology education in any AHC program.

Prior to developing a pathophysiology course for baccalaureate medical technology, nursing, and pharmacy students, Lewis (1981) surveyed nursing programs regarding pathophysiology courses. Two-thirds of the nursing programs had such a course. Among them, variations were reported in level (sophmore through graduate), credit hours (2 quarters through 6 semester hours), and teacher credentials. Reasons

the remaining one-third did not have a pathophysiology course were use of an integrated curriculum, insufficient time, no one qualified on the faculty, or other departments would not teach it.

Another topic in the literature was a concern for the relevance of science content to clinical practice, that is, the development of integrative competence. Boren, Dixon, and Harden (1982) cited and agreed with earlier authors that there is a weakness "between scientific knowledge and its application . . . nutrition education can not be effective unless it corresponds to real world situations" (p. 148). Barr (1979) designed microbiology courses for medical technology students which she claimed improved the integration between theory and practice. The interest in integrative competence may explain the inconsistency of faculty opinion in Krieger's (1977) study. Faculty wanted the chemistry courses to carry general education credit but when laboratories were indicated they wanted the sessions to occur during clinical rotations.

Vittetoe (1983) reviewed instruments designed and used by others to measure learning styles of health professions students. She generalized that the overwhelming evidence of several studies using different instruments indicate a student preference for concrete and teacher-structured experiences. In her study, she compared the learning styles of physical therapy and medical technology students with

each other and over time. From the literature, the study reported, and her 30 years of teaching experience, she "has found that most [allied health] students want factual material presented or directed by the teacher. They want to learn only that which is practical and has direct application to their future roles" (p. 664).

Students of allied health professions often share courses with others (Barritt, 1980; Giese & Lawler, 1978). Advantages and disadvantages claimed are increased efficiency, facilitation of career mobility, fostering the health care team approach, insufficient depth, irrelevance, and accreditation impediments (Burnett, 1973; Connelly, 1978; Core Concept in Allied Health, 1973; Meek, 1970; Neidle, 1985). King and Breegle (1983) proposed an "urgent need to identify the common components of the categories of allied health professions, provide a common education for them in the basic and social sciences, and then add discipline specific education to this general base" (p. 103-116).

Some have advocated team teaching by scientists and practitioners. The intent is to reduce students' perception of irrelevance and stimulate practitioners to apply scientific principles ("Interdisciplinary Panel Discussion", 1975; Talbert & Walton, 1976). Others have opposed dilution or reduction of science content and expressed the belief that science courses need to be taught by scientists

(Freston, 1976; Neidle, 1985; Pitkow & Davis, 1975).

Often AHC students outside of medicine "insist they get second class instruction, frequently from junior or less experienced and less qualified faculty" (AAHC, 1980b, p. 2). Many have reported the loyalty of the basic scientists is to the medical students (AAHC, 1980b; Hogness & Akin, 1977). Sachs and Reynolds (1983) disagree and quote Saxon.

> My salary may be paid by the College of Medicine but my soul belongs to the Graduate College. . . . The arrogance of medical faculties is a bar to genuine interdisciplinary activities and so is the arrogance of some in the academic world who view their fields as the only truly academic ones and view medical and other professional schools as trade schools. (Sacs & Reynolds, 1983, p. 146)

Career advice for begining scientists illustrates the possible differences in priorities between basic science and allied health faculty. "An advantage to working in many private medical schools is the absence of a large number of allied health programs that require an extensive teaching load. . . . You will be better able to concentrate on developing your research program" (Bell, 1983). Granger (1983) listed six priorities for a successful science career. He apologized for omitting teaching.

However some science as well as allied health faculty have taken the initiative to develop instructional material for allied health students (Giese & Lawler, 1978; Lewis, 1981; Wutka & Baxter, 1981). Heavy demands from the health professional schools on a pharmacology department encouraged

the science faculty to develop a computer assisted teaching system for pharmacology courses (Pazdenik & Walaszek, 1983). They reported a broader user group than anticipated and improvement in student pharmacology standardized test scores.

A goal of the American Chemical Society Task Force on Chemical Education for Health Professions was "to open communication . . . to form affiliations with . . . organizations of the health professions" (Treblow, Daly, & Sarquis, 1984, p. 629). The chemists developed a course syllabus but were disappointed because the "professional organizations . . . are caught up in their own problems and agendas . . . [a] two semester course in chemistry is, unfortunately, of minor concern to some health professions" (p. 269).

Many have suggested better communication between practitioners and scientists (Christensen, 1972; "Core Concept in Allied Health", 1973; "Interdisciplinary Panel Discussion", 1975; Meek, 1970; Sachs & Reynolds, 1983). "The science faculty need not only speak in tongues (symbols) and the allied health faculty [need] not only speak in tasks (jobs) if the two groups are to communicate with each other" (Meek, 1970. p. 7).

Meek (1970) summed up part of the situation when she noted that

> programs in the allied health field are assigned to one pattern of organization and yet a considerable portion of their curriculum is the assigned responsibility of another pattern of organization--with those at the top working under different sets of priorities, how can the faculty upon whom the ultimate work load rests be less than enthused. (p. 5)

Incongruence in perspective among administrator groups, science, and allied health faculties is evident in other studies. In the governance study the vice presidents viewed health center decision making "as a relatively well controlled system" (AAHC, 1980b, p. 58) with themselves as leaders. They reported seriously considering the deans' recommendations. The allied health deans did not share this prespective. They were dissatisfied with their influence on AHC decision making. College-wide, Wilson (1977) found that allied health faculty believed their deans had little influence as educational leaders. The deans wanted a greater role in college academic affairs.

Miller, Beckham, and Pathak (1983) studied formal and informal missions and goals of 41 colleges of allied health. A goal, to "conduct comprehensive program[s] of health sciences curricula" was considered formally operant by 65.7% of faculty and 46.7% of the administrators. This finding surprised the investigators. Miller et al. thought the administrators would be more likely to support and formalize

comprehensive program development. The explanation was that administrators were more concerned with comprehensive allied health curricula. Faculty were more interested in the health--biophysical--sciences.

This literature review has explained Stark's framework and the dependence of this study on it. The importance which the health professionals ascribe to the biophysical sciences has been established.

## SECTION III

## RESULTS

In this section the responses to the preliminary statements and the results for each of the four research questions are presented. Comments regarding the four open-ended questions are presented in context with the sets of statements which relate to each research question.

The accompanying tables show all statements and the percent consensus (100% or 80%) achieved by the final round. If the consensus was in disagreement with a statement, this is indicated by a "D" following the percent of consensus listed. If by round three, consensus was less than 80% on an item this is indicated by a zero.

### Preliminary Statements

Most participants agreed that the biophysical science knowledge bases which individual allied health professions deem necessary for practice have been agreed upon (see Table 1). Most narrative data were from the minority who disagreed. "In general I agree, yet I am also of the opinion that for a number (more than 2) of the allied health professions there is little if any agreement." Another stated, "in many cases the individuals within the CAH have little or no appreciation of the basic science itself and teach it as a cookbook exercise."

The statements that allied health credentialed faculty should be able/qualified to teach any science related course

Table 1

Percent Consensus re: Statements 01, 01A, 04, and 04A

| Statement | Percent Consensus |
|---|---|
| 01 The biophysical science knowledge bases which individual allied health professions deem necessary for practice have been agreed upon by members of the respective professions. | 80 |
| 01A REVISED STATEMENT: The biophysical science knowledge bases which individual allied health professions deem necessary for practice have been agreed upon by members of most of the respective professions. | 80 |
| 04 Allied health credentialed faculty should be able to teach any science related course required of baccalaureate students in their respective professional phase curricula. | 80D |
| 04A REVISED STATEMENT: Allied health credentialed faculty should be qualified to teach any science related course required of baccalaureate students in their respective professional phase curricula. | 80D |

Note. D=Disagree.

required of baccalaureate students in their respective curricula prompted input reflecting the specialized nature of many allied health professions. "Oftentimes the allied health professions are so specialized basic science instruction would distract teaching faculty." "The statement is preposterous. No one is qualified to teach everything." "A single faculty member should teach in her area of expertise." "You wouldn't want a psychiatrist to remove your appendix!" "Why be part of a university if each

school/college is going to duplicate the effort?"

Panelists ranked the importance of university mission, college mission, and accreditation for establishing science related course faculty academic and professional credential requirements (see Tables 2 & 3). The rank of importance of the three factors for establishing faculty academic credentials remained constant among rounds. Movement of opinion concerning important factors in establishing faculty professional credentials was more pronounced, with college mission occupying a different rank on each round. But the significance of the entire statement may be moot, because a majority disagreed that science related course faculty should have a health professional credential (see Table 4, statement 06).

Representative narrative responses were: "I believe that professional accreditation standards should be more important. However there still exists mail order diploma mills that allow individuals to participate in some allied health professions." "Academic faculty must respond to college/university missions to obtain tenure." "The academic credential of the science related faculty is the institutions responsibility (and prerogative) more than the accreditation standard; although it is an appropriate concern as expressed in the standard." "In an academic institution the mission of the college has priority if that college is to remain part of the institution. Accreditation

Table 2

Rank of Importance of Factors in Establishing Science Related Course Faculty Academic Credentials

02 Which of the following should be most important in establishing preferred science related course faculty academic credentials?

| | Votes in Round* | | Rank in Round | |
|---|---|---|---|---|
| | I | II | I | II |
| Univer. Mission | | | | |
| most important | 12 | 9 | | |
| intermediate | 3 | 2 | 1 | 1 |
| least important | 6 | 5 | | |
| CAH Mission | | | | |
| most important | 10 | 5 | | |
| intermediate | 7 | 10 | 2 | 2 |
| least important | 2 | 2 | | |
| Accreditation | | | | |
| most important | 4 | 2 | | |
| intermediate | 9 | 2 | 3 | 3 |
| least important | 6 | 10 | | |

*Some did not rank all three.

Table 3

Rank of Importance of Factors in Establishing Science Related Course Faculty Professional Credentials

03 Which of the following should be most important in establishing preferred science related course faculty professional credentials?

| | Votes in Round* | | | Rank in Round | | |
|---|---|---|---|---|---|---|
| | I | II | III | I | II | III |
| Univer. Mission | | | | | | |
| most important | 8 | 8 | 10 | | | |
| intermediate | 5 | 3 | 2 | 2 | 1 | 1 |
| least important | 6 | 6 | 4 | | | |
| CAH Mission | | | | | | |
| most important | 11 | 3 | 3 | | | |
| intermediate | 8 | 12 | 13 | 1 | 3 | 2 |
| least important | 2 | 0 | 0 | | | |
| Accreditation | | | | | | |
| most important | 6 | 5 | 3 | | | |
| intermediate | 6 | 6 | 2 | 3 | 2 | 3 |
| least important | 7 | 9 | 11 | | | |

*Some did not rank all three.

standards cannot control a college mission but should be compatible with that mission." "I consider the university mission as a broad based statement, thus believe the CAH and accrediting bodies are and should be most important in defining professional credentials." "[I] cannot imagine these [university and college missions] being incongruent."

Responses to the preliminary statements established 80% consensus that the biophysical science knowledge bases for the allied health professions have been agreed upon and that individual faculty should not be expected/qualified to teach all required science related courses in a baccalaureate curriculum. Among important factors to consider in establishing science related course faculty credentials were first the university mission followed by college mission and accreditation standards.

Science Related Course Faculty Qualifications

Research question number one: What professional and academic qualifications should science related course faculty have?

All agreed that science related course faculty should have a primary appointment in the university (see Table 4) and demonstrate effectiveness teaching undergraduate allied health students. No one agreed that tenure or senior facuty rank were necessary. Concerning tenure, "they come with and without." Concerning rank, "some instructors and assistant professors are the best teachers." "A blend of all levels

Table 4

Percent Consensus re: Science Related Course Faculty Qualifications

| Statement | Percent Consensus |
|---|---|
| Science related course faculty should: | |
| 05 Have a doctoral degree. | 0 |
| 06 Have a health professional credential. | 80D |
| 07 Show evidence of recent/current research or scholarship. | 80 |
| 08 Excluding research and scholarship, show evidence of own continuing education. | 80 |
| 09 Have a primary faculty appointment in some unit of the university. | 100 |
| 10 Hold tenure. | 100D |
| 11 Hold a senior faculty rank (associate or full professor). | 100D |
| 12 Graduate students are acceptable as science related course faculty assistants for college of allied health undergraduates. | 100 |
| 13 Graduate students are acceptable as science related course faculty for college of allied health undergraduates. | 80D |
| 13A ADDITIONAL STATEMENT: Demonstrate effectiveness teaching undergraduate allied health students. | 100 |
| 13B ADDITIONAL STATEMENT: Hold a graduate degree in the same or closely related science of the science to be taught. | 80 |

Note. D=Disagree.

would make for stronger departments."

All reported graduate students as acceptable science related course faculty assistants, "providing they have content, capacity, and interest." Most (80% consensus) indicated that they were not acceptable as regular science related course faculty. "[I] do not believe they have adaquate time while students to give the necessary committment required. . . . Undergraduates may get shortchanged." Representative minority opinions were "it depends where the graduate student is in his preparation." "I have a few faculty members who are pursuing advanced degrees somewhere else. In effect they are graduate students."

Agreement and 80% consensus was recorded for science related course faculty to show evidence of research and continuing education. "Should never stop--why else are universities 'halls of knowledge'." Because continuing education was not defined, agreement and 80% consensus for this statement (08) may be deceptive. One expert wrote, "[it] would depend on [the] meaning of continuing education. In broadest sense of reading [I] agree."

A majority agreed, but consensus was not reached that science related course faculty have a doctoral degree. Panel experts disagreed (80% consensus) that these faculty needed a health professional credential. "I don't see how the professional credentials necessarily relate to basic

science instruction." "I don't care if basic science faculty have any professional credentials." "A PhD and interest in the field is enough" but the degree should be "in sciences not administration or education." Another "would rather have a nondoctoral who knows/understands the medical field than a doctoral in an inappropriate area." Congruent with these remarks was agreement (80% consensus) that the faculty member hold a graduate degree in the same or closely related discipline of the science to be taught.

The first open-ended statement (Please describe any other qualifications science related course faculty should have.) prompted input concerning communication skills, enthusiasm for students and teaching, and credentials. Sample comments were the ability to "speak good English," demonstrate "reasonable instructional techniques and skills," and "they should love to teach and be around the students in their charge."

Opinions about credentials were more specific. "Ideally those individuals teaching basic science courses should have an advanced degree in a basic science. Those courses which are applied science courses should be taught by individuals with advanced degrees and with professional credentials." "Any graduate student teaching in science related courses should be working on a PhD in that science." "Most of the subjects in pathology should be taught by faculty or residents in pathology."

In summary, 100% of the panel experts agreed that science related course faculty should have a primary appointment in some unit of the university and demonstrate effectiventss teaching undergraduates. They agreed graduate students are acceptable as assistants (100% consensus) but not as faculty (80% consensus). All concurred that tenure and a senior rank were not necessary. Most concurred that research (80% consensus) and continuing education (80% consensus) were to be expected, although the latter was not defined and therefore confusing. No consensus was reached on the doctoral degree requirement but 80% consensus was achieved for a science related degree requirement and the absence of a need for a professional credential.

Expectations for Science Related Course Faculty

Research question number two: In what roles should science related course faculty engage?

Each of the statements in this set was posed thrice, to apply to each of the major organizational structures based on course sponsorship and faculty appointment. For faculty with primary appointments in the CAH teaching college sponsored courses there was 100% consensus for seven of the nine statements (see Table 5) and few narrative remarks. All participants expected CAH science related course faculty to participate in curriculum planning and accreditation activities, to engage in dialogue with others concerning science related courses, to select their teaching methods,

and to conduct research. There was agreement and 100% consensus that these faculty should counsel students and have students evaluate their courses.

As faculty appointment and course sponsorship were removed from the CAH there was less consensus of faculty role and fewer expectations. All concurred that college faculty should conduct research but consensus was 80% for this for noncollege faculty. One expert wrote that the research expectation would depend on the faculty members status with the university. Most (80% consensus) believed that non-CAH faculty who taught externally sponsored courses should engage in dialogue with CAH faculty. Regardless of science related course delivery structure, all agreed that faculty should choose their own teaching methods and that students should evaluate the courses.

Opinion was divided regarding participation in curriculum planning and accreditation by non-CAH faculty teaching externally sponsored courses. This is "actually required by some accreditation bodies," or "faculty need to know how their courses complement curriculum/program" and "these are idealistic statements in a research university."

Responses to the counseling statements were diverse (see Tables 5 & 6). Although 80% consensus was reached for four items in this set, the prominent finding was diversity of opinion. Also about one-fourth did not respond or indicated no opinion. For all rounds some registered their

Table 5

Percent Consensus re: Science Related Course Faculty Roles by Organizational Structure: Sponsor (S) and Faculty (F)

| Statement | Percent Consensus Courses Sponsored by CAH S CAH F | CAH S NCAH F | NCAH S NCAH F |
|---|---|---|---|
| Relative to the science related courses taught, the college of allied health faculty and administration should expect these science related course faculty to: | | | |
| 14 Participate in allied health curriculum planning. | 100 | 80 | 0 |
| 15 Participate in program accreditation activities. | 100 | 100 | 0 |
| 16 Participate in collegial dialogue with other college/program faculty about proposed or revised course goals, objectives, and methods. | 100 | 100 | 80 |
| 17 Provide academic counseling to CAH students. | 100 | 0 | 0 |
| 18 Set course goals. | 80 | 80 | 80 |
| 19 Develop course objectives, syllabi; select textbooks. | 80 | 80 | 80 |
| 20 Choose teaching methods. | 100 | 100 | 100 |
| 21 Conduct basic or applied research. | 100 | 80 | 80 |
| 22 Student evaluation of the science related course(s) should be expected. | 100 | 100 | 100 |

Note. NCAH=non-CAH.

opinion and then added modifications, "If it is related to the course [I agree] otherwise they should refer students to appropriate CAH faculty." "Unclear as to intent of statement."

Table 6

Percent Consensus re: Science Related Course Faculty Counseling Roles

| Statement | Percent Consensus Counsel Relative to Course | Curriculum |
|---|---|---|
| 22A ADDITIONAL STATEMENT: Sciense related course faculty who are members of the profession to which the students aspire and teaching required courses should provide academic counseling to CAH students. | 80 | 0 |
| 22B ADDITIONAL STATEMENT: Science related course faculty (allied health or basic scientist) with CAH primary appointments and teaching required courses should provide academic counseling to CAH students. | 80 | 80 |
| 22C ADDITIONAL STATEMENT: Science related course faculty outside of the CAH and teaching required but non-CAH sponsored courses should provide academic counseling to CAH students. | 0 | 80D |

Note. D=Disagree.
0=No consensus reached.

"Only allied health faculty, not basic scientists," should provide counseling. "All teachers should provide academic counseling."

All agreed that college faculty teaching college sponsored courses should provide academic counseling. Most concurred (80% consensus) that professional faculty should provide course counseling but no consensus was reached for professional faculty to provide curriculum counseling. "Some faculty may be a member of the profession but removed

from current up-to-date clinical practice." A majority disagreed that non-CAH faculty teaching non-CAH sponsored science related courses should provide academic counseling to CAH students relative to the course. There was 80% consensus that these faculty not provide curricular counseling.

In response to the open-ended question (What other expectations should the CAH have of science related course faculty?), input concerned service, teaching, and knowledge about allied health. The faculty should "serve on academic committees" or "participate in . . . university service." They should have "some knowledge of the mission of the college" or awarness of "the professional goals of the various allied health disciplines." "They should love their work."

In summary, 100% consensus was reached for all faculty to select their teaching methods and to have students evaluate the courses. Except for one dissenting vote regarding course goals and objectives there was 100% consensus that all other expectations listed were CAH faculty responsibilities. There were diverse opinions on the counseling issues but the emergent them was that this is a CAH faculty responsibility.

Faculty teaching non-CAH sponsored courses were generally accorded the same expectations as CAH faculty regarding specific course activities. For broad based

activities such as curriculum planning and accreditation activities there were fewer expectations for noncollege faculty. Some panel experts had identical expectations for faculty regardless of science related course organizational structure. "Irrespective of the location of the faculty, . . . instructors need to be sensitive to the needs of their students."

Role of Dean and Faculty in Evaluation of Non-CAH Faculty

Research question number three: What role should the college of allied health dean and faculty have in the evaluation of science related course faculty who do not have primary appointments in the college?

Most (80% consensus) agreed that the dean should have responsibility for all CAH sponsored courses regardless of faculty status and for all required courses regardless of sponsor (see Table 7). One who disagreed asked, "how can one dean be directly academically responsible for a science course that is under the administration of another dean? The fiscal decision rests with the dean of the unit presenting the course." Also "the responsibility may be shared" or the CAH dean may "be asked for evaluation input." Most (80% consensus) agreed if the dean was responsible for a course the dean should also have responsibility to evaluate faculty. Most agreed (80% consensus) that the CAH dean have responsibility for CAH sponsored courses and all concurred that deans of the respective colleges should have

Table 7

Percent Consensus re: Role of the CAH Dean in Evaluation of non-CAH Science related Courses

| Statement | Percent Consensus |
|---|---|
| 23 The college of allied health dean should have administrative and academic responsibility for all college sponsored science related courses (no matter where the teaching faculty hold their primary appointment). | 80 |
| 24 The college of allied health dean should have responsibility for the academic integrity of all required professional phase science related courses (no matter what college or department sponsors them). | 80 |
| 24A ADDITIONAL STATEMENT: The college of allied health dean should have responsibility for the academic integrity of all required professional phase science related courses sponsored by the CAH. | 80 |
| 25 In situations where the college of allied health dean should have academic or administrative course responsibility he should also have responsibility to evaluate the science related course faculty. | 80 |
| 25A ADDITIONAL STATEMENT: Deans of the respective colleges should have responsibility for the academic integrity of all courses sponsored by their colleges. | 100 |

responsibility for the academic integrity of all courses sponsored by their colleges.

Statements 26 through 31 addressed college of allied health faculty role in the evaluation of non-CAH faculty who teach science related courses sponsored by the CAH or another college (see Table 8). All agreed that these faculty should be evaluated, that the evaluation should address all CAH

Table 8

Percent Consensus re: CAH Evaluation of NCAH Faculty Who Teach Science Related Courses

| Statement | Percent Consensus Courses sponsored by CAH | NCAH |
|---|---|---|
| Formal college of allied health evaluation of science related faculty who teach required professional phase courses should. | | |
| 26 Be confined to the decision to retain or dismiss the faculty member. | 80D | NA |
| 27 Be confined to the decision to retain the course as required or not. | 80D | 0 |
| 28 Address all expectations the college has of the faculty member. | 100 | 100 |
| 29 Not occur. | 100D | 100D |
| 30 Be communicated to the science related course faculty and his/her chair or dean. | 100 | 100 |
| 31 Affect merit raise, tenure, and promotion decisions made by the science related course faculty members primary department. | 80 | 80 |

Note. D=Disagree.
0=No consensus reached.
NCAH=non-CAH.

expectations, and be communicated to the faculty member and his or her dean or chairperson. "Evaluation should be communicated to the faculty member teaching the course and if necessary to the head of the faculty members primary department and that is all." "The mission for which the faculty member was asked to join the faculty should be

clearly defined as well as . . . guidelines for promotion, raises, services, etc."

Most panel experts did not agree (80% consensus) that the CAH evaluation should be confined to a decision to retain or replace the faculty member or course. Most agreed (80% consensus) that the evaluation should affect tenure and promotion for the faculty member in his or her respective department.

In summary, participants believed that non-CAH science related course faculty should be evaluated by CAH faculty and administration and that this evaluation be communicated to the faculty member and his or her primary department. The deans were to be responsible ultimitely for the courses sponsored by their respective colleges. If problems occur with externally based faculty or courses, communication was identified as a method of choice for resolving differences. "If I'm unhappy with an anatomy course sponsored by the college of medicine I'd sit down with the dean of medicine and work it out cooperatively."

## CAH Control of Delivery and Content of Science Related Courses

Research question number four: "What control should the college of allied health faculty and dean have upon the delivery and content of science related courses?"

The panel experts ranked curricula responsibility as belonging first to faculty, followed by accreditation, and

Table 9

Rank of Locus of Responsibility for Allied Health Curricula

32 Please rank order where the primary responsibility for the allied health curricula should rest.

| | Votes in Round* | | Rank in Round | |
|---|---|---|---|---|
| | I | II | I | II |
| Dean | | | | |
| most responsibility | 2 | 0 | | |
| intermediate | 6 | 5 | 3 | 3 |
| least responsibility | 11 | 13 | | |
| Faculty | | | | |
| most responsibility | 14 | 17 | | |
| intermediate | 5 | 2 | 1 | 1 |
| least responsibility | 1 | 0 | | |
| Accreditation | | | | |
| most responsibility | 4 | 2 | | |
| intermediate | 8 | 12 | 2 | 2 |
| least responsibility | 7 | 5 | | |

*Some did not rank all three.

Table 10

Percent Consensus re: Curricula Responsibility

| Statement | Percent Consensus |
|---|---|
| 33 Responsibility for the allied health curricula should be shared by the faculty and administration. | 100 |
| 34 Responsibility for the allied health curricula should be shared by all instructional personnel (class, laboratory, and clinical) regardless of appointment. | 80 |

dean (see Table 9). There was 100% consensus that curricula responsibility be shared by faculty and administration (see Table 10). Most also agreed (80% consensus) that all instructional personnel should share curricular responsibility.

Narrative data for these statements indicated that "all should have input" but "not necessarily equally." The "final responsibility should rest with department faculty" or "program chairperson." "Primary responsibility rests with the dean but primary work on curricula rests with faculty." "If the dean is the chief academic officer he has to be involved." How can the dean "capitulate decisions to [an] external party re: course quality?"

Regarding the deans responsibility (see Table 11) all agreed that the dean has an administrative role if there is a transfer of funds among colleges or departments. Most agreed (80% consensus) on a dean role if the course was

Table 11
Percent Consensus re: CAH Dean Responsibility for Science Related Courses

| Statement | Percent Consensus Courses Sponsored by CAH | NCAH |
|---|---|---|
| The dean should: | | |
| 35 Attract and retain qualified faculty to teach these courses. | 80 | 0 |
| 36 Identify qualified faculty to teach these courses. | 0 | 80D |
| 37 Participate in course development or revisions. | 80D | 80D |
| 38 Have an administrative role in the course delivery under all circumstances. | 0 | 0 |
| 39 Have an administrative role in the course delivery if the course is limited to allied health students. | NA | 80 |
| 40 Have an administrative role in the course delivery if there is a transfer of funds to the other college/department for the course. | 100 | 100 |

Note. D=Disagree.
0=No consensus reached.
NCAH=non-CAH.

limited to allied health students. A majority disagreed with a CAH dean role for courses sponsored outside of the college (statements 35 through 38). Eighty percent consensus was reached that the dean not identify faculty or participate in course development for externally sponsored courses.

Most participants disapproved (80% consensus) of a dean role in course development where ever the course was

sponsored. The dean "lacks power but can make sugggestions." "In reality deans have little to do with the specifics of the curricula so their responsibility is to obtain a faculty that is competent at developing and maintaining a curriculum." One who advocated a dean role stated, "a dean should be in a position to intergrate all information all the time."

Within the CAH, most concurred (80% consensus) that the dean has a role in attracting and retaining qualified faculty. But when it came to specifically identifying faculty to teach the courses "one should trust their colleagues." "Allied health programs [are] too varied for one person to have enough expertise to identify qualified faculty in all areas."

Some indicated that many of the roles are "usually delegated to the chair" or should be. The "dean is ultimately responsible but actual management is delegated to department heads." "We assign to departments the responsibility to administer all interdisciplinary courses." Or "all should have input but first responsibility should rest with the department faculty." The "chairperson should have final responsibility." Or "the curriculum is the responsibility of the faculty!"

There was considerable agreement regarding specific roles of CAH faculty not teaching science related courses (see Table 12). For courses sponsored outside of the

Table 12

Consensus re: CAH Faculty Responsibility for Science Related Courses by Organizational Structure: Sponsor (S) and Faculty (F)

| Statement | Percent Consensus Courses Sponsored by CAH S CAH F | CAH S NCAH F | NCAH S NCAH F |
|---|---|---|---|
| College of allied health faculty who are not teaching science related courses should: | | | |
| 41 Identify faculty to teach these courses. | 0 | 0 | 100D |
| 42 Have input into the science related course(s) goals - objectives under all circumstances. | 80 | 80 | 0 |
| 43 Have input into the science related course(s) goals - objectives if/when the course is limited to allied health students. | 100 | 100 | 100 |
| 44 Have input into the science related course(s) goals - objectives if/when there is a transfer of funds from the college of allied health to the other college/department. | NA | 100 | 80 |
| If and when college of allied health faculty input is warranted the faculty should: | | | |
| 45 Relay accreditation requirements to the science related course faculty. | 100 | 100 | 100 |

Table 12--continued

| Statement | Percent Consensus Courses Sponsored by: CAH S CAH F | CAH S NCAH F | NCAH S NCAH F |
|---|---|---|---|
| If and when college of allied health faculty input is warranted the faculty should: | | | |
| 46 Relay practice situations which the students are likely to encounter to the science related course faculty. | 100 | 100 | 100 |
| 47 Recommend course goals. | 100 | 100 | 80 |
| 48 Recommend specific course content. | 100 | 100 | 80 |
| 49 Recommend teaching methods. | 0 | 80D | 100D |
| 50 Recommend course textbooks. | 0 | 0 | 0 |

Note. D=Disagree.
0=No consensus reached.
NCAH=non-CAH.

college most agreed (80 or 100% consensus) that faculty have input if the course is limited to allied health students and if there is a transfer of funds. When course input is warranted, 80 to 100% consensus indicated that faculty should relay accreditation requirements and practice situations plus recommend course goals and specific content. For CAH sponsored courses 100% consensus was achieved for these statements.

For externally sponsored courses there was 100% consensus that CAH faculty not identify science related

course teachers. For college sponsored courses, opinions were mixed. Collective responses indicated that participants considered the recruitment of college faculty a dean role. However they viewed the identification of faculty to teach specific courses as a department head task. "Faculty may have input, but . . . the decision is up to the department head."

Most (80% consensus) agreed that CAH faculty not teaching science related courses should have input into course goals for CAH sponsored courses. Also most agreed that they recommend goals and specific course content for externally sponsored courses. A minority disagreed. Allied health faculty may "designate an area e.g., lung pathology but detailed content should be left to the basic science departments." "A basic course . . . should be just that and cover all areas . . . and not [be] directed toward any specific program or student." Among the minority who advocated that CAH faculty recommend teaching methods one wrote that this was pertinent to explain "the way their own students seem to learn best."

It is evident that the role of CAH faculty who do not teach science related courses is expected to be greatest when courses are sponsored by the CAH and taught by CAH faculty. Regardless of organizational structure participants expect CAH faculty to have input if the course is limited to allied health students and to communicate

accreditation requirements and practice situations. They are nearly unanimous in agreement that CAH faculty recommend course goals and specific course content. But participants tend to delegate choice of teaching methodology to the individual faculty.

In response to the terminal open-ended question (What other activities should the faculty or dean perform to enhance the delivery of science related courses taught by faculty without a CAH primary appointment?), the theme was communication. Basic science faculty participants asked that they be provided with feedback "from student evaluations." or "on how well students do in subsequent classes," or their "performance on state board exams." One participant suggested forums for CAH and non-CAH faculty as "they share a similar purpose and so should communicate regularly." Participants advocated "continuous . . . efforts to keep communication open" and provide "recognition."

In summary, the panel experts believed that the CAH dean had a major role in attracting college faculty but neither dean nor faculty had responsibility to identify faculty for specific courses. The dean was not expected to have a role in course development. CAH faculty were expected to have major input in course content and development regardless of course sponsorship. The exception was that they should not recommend teaching methods.

## Summary

Presented in this section are the results from the conduct of this study. According to the study design, items representing external, internal, and intraorganizational elements of Stark's framework are identified and validated when 100% consensus was reached. Other items have been identified and may be valid if 80% consensus was achieved. In the next section these items are synthesized into criteria that can be used to evaluate the delivery system for science related courses for baccalaureate allied health students in academic health centers.

## SECTION IV

## SUMMARY AND CONCLUSIONS

### Summary

This study was undertaken to identify and validate criteria that can be used to evaluate the delivery system for science related courses. The need for a set of criteria was justified by findings in the literature about the sciences in curricula for students of the health professions. Several studies were reviewed which indicated that relative to the sciences "the quality of the teaching program for students in fields other than medicine continue to present problems for those AHCs with several schools" (AAHC, 1980a, p. 9).

Stark's theoretical framework (Stark et al., 1986) and this study's use of it was explained. The literature review indicated that some of the elements identified by Stark and associates as specific influences on professional programs were particularly relevant concerning criteria for science course delivery. These included the professional knowledge base; accreditation standards; program interrelationships; mission, staffing, program organization, and faculty characteristics; and curricular tensions.

Regarding the study design, seven college participants were selected as leaders of their kind with the assistance of two other deans of allied health. The 21 panel experts were deans of these colleges or allied health and basic

science faculty selected for their expertise by the respective deans. The role of the panel experts was to participate in a modified Delphi study to identify and validate the criteria.

The panel experts were provided with a list of the science related courses unique to their respective institutions. Each course concerned a biophysical science and was required of students during the professional curriculum. Each catalog course description was judged by 4 nonparticipants (2 basic scientists and 2 health professionals) to fulfill the conceptual competence outcome as defined in Stark's framework. That is, a primary purpose of the course was to develop an "understanding of the theoretical foundations" (Stark et al., 1986, p. 252) of the science necessary for professional practice. Among the colleges, 176 courses with a reliability coefficient of .94 were identified as sciences.

Listed in the section following are the criteria that should be used to evaluate the science course delivery systems described. Items which are contraindicated will be listed also. Next, selected findings relevant to the criteria and the literature will be discussed. The studies weaknesses will be reviewed followed by recommendations for implementing the criteria. Finally suggestions for further research and the use of Stark's framework for allied health professional education research will be proposed.

## Criteria

The criteria recommended to evaluate science related course delivery systems have been synthesized from the panel expert data presented in Section III. They are applicable for baccalaureate allied health students in academic health centers. Criteria are recommended for adoption or consideration if 100% or 80% consensus was achieved respectively. Some potential criteria received a negative consensus. These are listed as criteria not to employ or requiring further justification.

Research question number one: What professional and academic qualifications should science related course faculty have? Qualifications for all science related course faculty.

Criteria to adopt:

Science related course faculty should

1. Have a primary faculty appointment in some specific unit of the university.
2. Demonstrate effectiveness teaching undergraduate allied health students.
3. Show evidence of research or scholarship.
4. Hold a graduate degree in the same or closely related science of the science to be taught.

Graduate students

5. Are acceptable as science related course faculty assistants for CAH undergraduates.

Criteria to consider:

Science related course faculty should

6. Show evidence of periodic continuing education.

7. Have a doctoral degree.

Criteria not to employ or requiring further justification:

A. Faculty rank.

B. Tenure status.

C. Health professional credential.

D. Graduate students as full-fledged faculty (teachers of science related courses).

Research question number two: In what roles should science related course faculty engage? Roles for science related course faculty--regardless of course sponsor or faculty appointment.

Criteria to adopt:

Science related course faculty should

8. Participate in collegial dialogue with other college/program faculty about proposed or revised course goals and objectives.

9. Set course goals.

10. Choose teaching methods.

11. Develop course objectives, course syllabi, and select textbooks.

12. Expect student course evaluation.

13. Conduct basic or applied research.

Additional criteria to adopt for all science related course faculty when the course(s) is/are sponsored by the CAH:

Science related course faculty should

14. Participate in program accreditation activities.

15. Participate in allied health curriculum planning.

Additional criterion to adopt for all science related course faculty with a primary CAH appointment:

Science related course faculty should

16. Provide academic counseling relative to the course(s) taught.

Research question number three: What role should the college of allied health dean and faculty have in the evaluation of science related course faculty who do not have primary appointments in the college? Role of the CAH dean in the evaluation of non-CAH science related course faculty.

Criteria to adopt:

17. The dean has academic and administrative responsibility for the integrity of all science related courses sponsored by the dean's college.

18. When the dean has academic or administrative course responsibility the dean should also have responsibility to evaluate the science related course faculty.

19. Dean responsibility to evaluate science related course faculty may be exercised directly or delegated.

CAH evaluation of non-CAH science related course faculty, teaching CAH sponsored or required non-CAH sponsored science related courses. Criteria to adopt:

College of allied health evaluation should

20. Occur.

21. Address all expectations the CAH has of the faculty member.

Criteria to propose that the other college adopt:

22. Results of the CAH evaluation should affect merit raise, tenure, and promotion decisions made by the science related course faculty members primary department.

Research question number four: What control should the college of allied health faculty and dean have upon the delivery and content of science related courses? Control of the CAH dean related to the delivery and content of science related courses.

Criteria to adopt:

The college of allied health dean should

23. Attract and retain qualified faculty to teach science related courses sponsored by the CAH.

24. Have an administrative role in the science related course delivery if there is a transfer of funds between colleges/units.

25. Have an administrative role in the science related course delivery if the externally sponsored course is limited to allied health students.

Criteria not to employ or requiring further justification for use:

E. Dean participation in science related course development or revisions, regardless of college sponsor.

F. Dean identification of specific faculty to teach specific science related courses.

Research question number four: What control should the college of allied health faculty and dean have upon the delivery and content of science related courses? Control of CAH faculty who do not teach science related courses upon the delivery and content of science related courses.

Criteria to adopt:

CAH faculty who do not teach science related courses should

26. Participate in collegial dialogue with science related course faculty to recommend science related course goals and objectives if the science related course is CAH sponsored, or limited to allied health students, or there is a transfer of funds between units.

27. Relay accreditation requirements to science related course faculty.

28. Relay practice requirements to science related course faculty.

Criteria to consider:

CAH faculty who do not teach science related courses should

29. Participate in collegial dialogue with any science related course faculty to suggest goals and objectives--unless circumstances to the contrary are established.

Criteria not to employ or requiring further justification:

CAH faculty who do not teach science related courses should

G. Recommend teaching methods.

H. Identify faculty to teach science related courses.

Discussion

Individual professionals, like the panel experts in this study, may indeed believe that the profession's biophysical science knowledge base is agreed upon (see Table 1). But the literature support for this is inconclusive. In solitude, perhaps each is certain of the knowledge base. But when three or more convene, as shown in the minutes of curriculum committees, there is far less consensus on content. Licensure boards, certification agencies, and testing companies face the challenges of justifying that their screening devices (examinations) do test the knowledge needed for professional practice. If and when the knowledge

base is known it is probably best to recognize it as dynamic.

Participants were nearly unanimous that professional faculty need not be qualified to teach each science related course. This may imply a transfer of the arts and sciences model: A botanist does not teach entomology to juniors even though a botanist and entomologist both may teach general biology. Also, it may indicate a belief that basic science rather than professional faculty should teach the science related courses. Whatever the reasons, the finding is the antithesis of those who believe that professional faculty "should be able to cover any [emphasis added] area of the entry level curriculum" (Covey & Burke, 1987, p. 4).

Unlike profession specific accreditation standards these criteria are not intended to be used to identify course content. Each criterion is sufficiently broad based to apply across any AHC baccalaureate CAH program. University issues, faculty appointment, research expectations, and role of graduate students are addressed. The administrator is identified as a dean and the criteria state the responsibilities the dean should have.

A review of CAH catalogs indicated that both allied health and basic science faculty are capable of and do teach science related courses. Accreditation standards usually itemize required professional but not basic science faculty qualifications. Yet, most panel experts did not think that

science related course faculty needed professional credentials. Whatever the initial faculty background the criteria do not discriminate between basic science or professional faculty.

Senior faculty and tenure status were unanimously rejected as criteria for faculty qualifications. Why is this, when the AAHCs governance study authors published that nonmedical health center students "insist they get second class [science] instruction, frequently from junior faculty or less experienced and less qualified faculty" (AAHC, 1980b, p. 92)? Maybe some traditional measures (academic or accreditation) of faculty expertise are not perceived as germane in this situation. Perhaps in this situation the more qualified senior faculty are those who meet criteria 1 through 5.

In the interest of instilling positive attitudes toward the health care team concept, cost-effectiveness, credit transferability, or quality many advocate the use of externally sponsored courses for allied health students. The experts in this study concur that there should be fewer expectations of science related course faculty who teach externally sponsored courses or who are not primary CAH appointees. What are the implications for CAH faculty workload regarding curriculum planning, accreditation self-studies, and academic advising when critical portions of the curriculum are taught by external faculty? Some would argue

that vital aspects of many allied health curricula are already taught by external faculty, for example, clinical practica. How much delegation is enough?

It was surprising that panel experts did not want external faculty to provide academic counseling to CAH students in relation to their own courses. This could imply a recognition of different priorities for faculty of different colleges. It may also be a matter of campus geography. Also it may be a manifestation of a preference to take care of one's own students or a lack of trust or knowledge about the external faculty.

Panel experts did expect course evaluation no matter what the faculty status. Also the participants did accord considerable input by college faculty who were not teaching science related courses. Panel experts did not expect the deans to participate in actual course development. Nor did experts expect the dean or faculty to identify specific science related course faculty. The assumption is that this is a department chairperson duty. Is faculty recruitment and course assignment exclusively a dean or chairperson responsibility? If CAH faculty participated more in faculty recruitment, identification, and assignment perhaps they would trust the others to provide academic course advising or determine detailed course content.

## Weaknesses

This study relied on expert opinion. The topic was interdisciplinary and the analysis qualitative. While not weaknesses of themselves the biases toward specialization and quantitative analysis are acknowledged. Stark's framework is broad. However this investigator found it to be a workable model for a study of this kind.

Opinions of students or practicing professionals were not sought. Those who would be affected by science course delivery system criteria should contribute to criteria development. If a CAH faculty were to consider the use of these criteria, representative practitioners and students should participate in the prerequisite deliberations.

The statements about academic counseling may have been unclear. Therefore the criteria and discussion on this issue may be invalid. Some did not enumerate, or had difficulty enumerating, the choices listed for the ranking statements (02, 03, & 32). Others indicated that the choices should not be mutually exclusive. However, no one mentioned that the choices provided were unimportant or inappropriate. Also no one suggested any new item.

## Implementation of the Criteria

The criteria identified in this study address the qualifications, roles, and evaluation of CAH-AHC science and professional faculty under different organizational

structures. It is unlikely that any CAH would or should adopt these criteria: Only 21 panel experts in 7 colleges directly contributed to their development. However faculty and administration of a CAH could decide by committee or their own internal Delphi which of these criteria to adopt and if so how each would be measured. Thus their criteria would be based on this multi-college external study, reviewed internally, imposed from within, and monitored from within.

The same procedure could be followed to modify these criteria for application in community colleges, nonhealth center four-year colleges, and graduate entry level programs. They could be revised for use by other health professional colleges. An accreditation agency with multiple constituents such as the Committee on Allied Health Education and Accreditation, could review the criteria for applicability as standards to serve across multiple programs.

Recommendations for a CAH to Adopt the Criteria

If a CAH faculty and administration were to consider the adoption of the criteria identified and validated by this study the following recommendations are offered.

1.1 Dean should appoint a college-wide committee of five or more persons to recommend criteria and measures

to adopt to evaluate the college's science related course delivery system.

or

1.2 Chairperson of an ongiong college-wide [academic affairs] committee should appoint a subcommittee of five persons to recommend criteria and measures to adopt to evaluate the college's science related course delivery system.

2. Either the dean appointed or college-wide committee may include basic science faculty or adminintrators from outside of the college. This would vary with the institution and the nature of the appointments of those currently teaching science related courses.

3. In order to avoid bias the science related courses should be identified essentially as they have been for this study; using catalog course descriptions and Stark's definitions as guidelines for interpretation. The evaluators should be basic science and health professional faculty who do not teach allied health students.

4. Committee should conduct an internal modified Delphi study among CAH faculty, selected students, administrators, practitioners, and basic scientists regarding the proposed criteria and measures.

5. Initially the proposed criteria should be those

recommended by this study but the measures would be unique to the institution.

6. Committee should review the internal data and recommend college-wide criteria and measures, to department chairpersons and dean.

7. Dean and department chairpersons should agree on implementation of an evaluation cycle for criteria and measures to evaluate the colleges science related course delivery system. Exceptions, if any, should be agreed upon in advance.

The usefulness of the study is not just the identification and potential use of the criteria. Some of the study's weaknesses, extraneous findings, and criteria deserve further study. The practical and research potentials for Stark's framework in allied health education are multiple.

Suggestions for Further Research and Practice

Performance of faculty who do and do not meet selected criteria could be compared. Does a difference in student outcome measures, such as biophysical science board scores correlate with science related course faculty qualifications? This study might be program or discipline specific and control for student grade point averages.

Prior to the development of the instrument a decision was made not to single out the department chairpersons. But some participants indicated specific roles for the

department chairperson. Others implied that the study would be incomplete without specifically designating a role for the chairperson. Another study could be to investigate the academic and administrative role of the department chairpersons concerning course delivery. Activities that are or are not shared with other faculty or deans could be determined. It or any allied health chairperson study should be designed to control for the actual occupation of the department chairperson.

By definition the deans are the chief academic officers of their colleges. The identification of roles of CAH deans or assistants in academic affairs, including curriculum development, could be compared with the academic activities undertaken by other health professional college deans. Do faculty expectations for and dean academic activities differ when the dean is not a member of the profession?

Relatively excessive time in administrative activity by CAH faculty without administrative appointments has been reported. Would the use of more externally taught courses parallel more faculty or chairperson time spent in administration (for these courses) rather than teaching or research associated with the content? A study could be designed to correlate program faculty or department chairperson activity with the number of externally taught courses.

The attitudes about and practices of academic advising

among CAH faculty deserve further investigation. The nonconsensus, nonresponses, varied remarks, and finding that most concurred on no academic advising role by external faculty should be explored. Do students' academic advising needs differ by course sponsorship or faculty appointment?

Stark's framework and the Delphi method could be employed as it has been in this study but to identify criteria for the delivery of clinical courses. The agencies and programs could be specific (hospital only) or not. The resulting criteria could be used to determine if a given site is acceptable for student clinical experience or who is eligible for an adjunct appointment.

At clinical sites the utility of these criteria could be tested. Students could be assigned randomly to agencies which do and do not meet the selected criteria. Selected outcomes could be measured prior to and after the clinical rotation. Then comparisons could be made.

If certain professional outcomes, as conceptualized and defined by Stark and associates, are found or perceived deficient in a program or programs, faculty might identify in what other courses these competencies might be reinforced. Two allied health curricula outcomes frequently discussed in the recent (late 80s) literature are the competency, interpersonal communication and the attitude, a scholarly concern for improvement. Such outcomes, if deemed

necessary, are not learned in one course or during one semester.

Stark's framework can be used to identify professional preparation outcomes that are unique or shared among allied health programs. Which courses are or are not appropriate to share among programs? "What programs have similar professional preparation environments?" (Stark et al., 1987. p. 558). Knowledge of this could be used to decide which programs belong in what departments or which programs might cooperate in course development, evaluation, or self-studies. By using outcome and environment as conceptualized in the Stark framework these questions are answered in part by the theoretical base necessary for practice and not administrative fiat.

## Conclusion

To answer the research questions the literature review indicated that certain influences on professional preparation programs as identified by Stark, Lowther, Hagerty, and Orczyk (1986) were particularly cogent. These included the professional knowledge base; accreditation standards; mission, staffing, and program interrelationships; faculty background and evaluation; and curricular tensions. Items on the instruments presented to the panel experts were representative of these influences.

The professional preparation outcome, conceptual competence, as defined by Stark et al, (1986) provided the basis for the identification of the science related courses.

The purpose of this study has been attained and presented. The criteria to evaluate science course delivery systems have been identified and validated by a small national group of CAH faculty and administrators. Recommendations to implement the criteria have been suggested. This report has concluded with suggestions for further research.

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